Part V

Analysis of the formation of C_2 and C_3

Chapter 10 described a first analysis using the Haser model. This part presents the main focus of this work, the analysis of the C_2 and C_3 formation using the ComChem model. While the Haser model is an abstraction of the physical reality of the coma of a comet, the ComChem model reflects the chemistry and physics in a cometary coma in a more realistic way. The following chapters describe the chemistry for the formation of the C_2 and C_3 radicals, the ComChem model, its physical model and the numerical approach used, the dataset used for this work, the input parameter including the reaction network developed for this study and the general use of the ComChem model. After the presentation of the results for each of the nights studied, the relative importance of the reactions for the formation of C_2 and C_3 are discussed. Following this the sensitivity of the results to uncertainties in the initial setup, nucleus composition as well as reaction rates, will be discussed. This part of the work is closed by a discussion of the results on the formation of C_2 and C_3 and the related hydrocarbon chemistry in the cometary coma and possible indications for the formation region of comet Hale-Bopp.